



# 2021 NOAA Great Lakes Environmental Research Laboratory Science Review

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NOAA GLERL Director



<https://www.glerl.noaa.gov/review2021/>

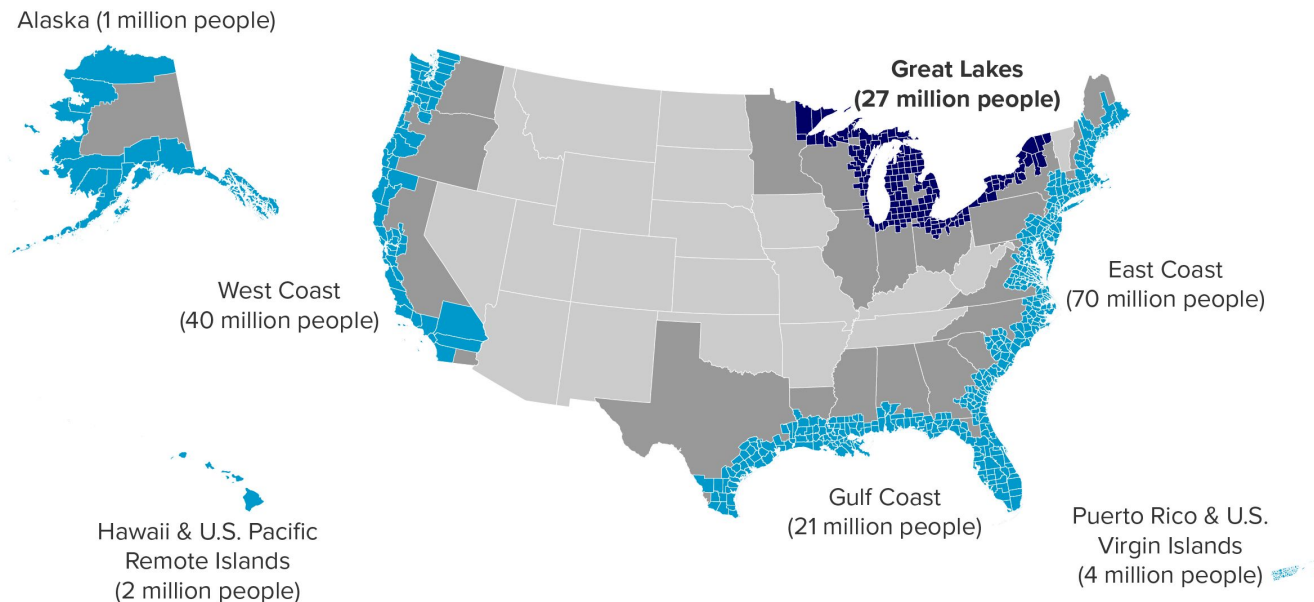


## GLERL is NOAA's freshwater research laboratory.



GLERL's approach to scientific research— integrated around physical, chemical and biological interactions— addresses the complex environmental challenges posed by a large-lake system in a state of flux and serves as a model for other freshwater and coastal ecosystems.

# GLERL serves the bi-national Great Lakes region.



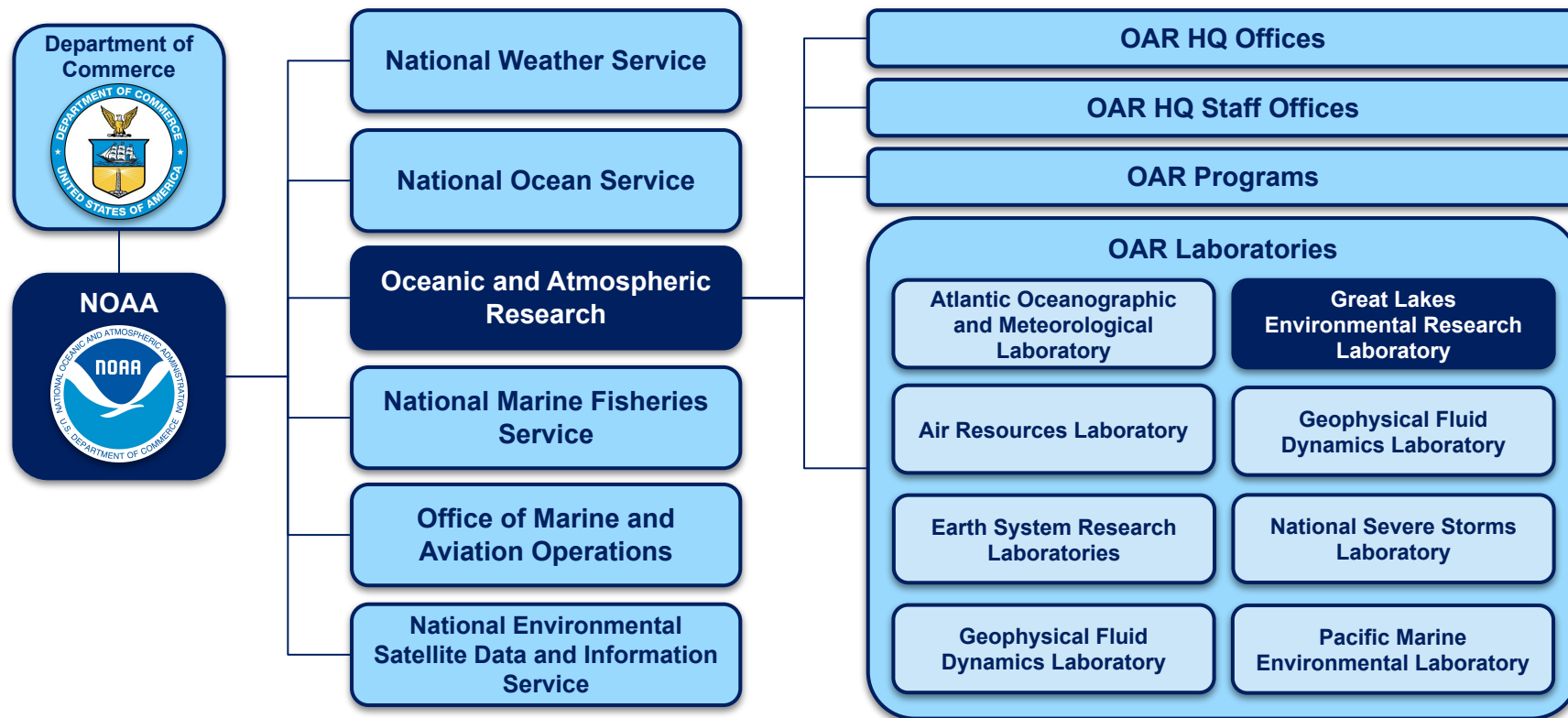
Based on American Community Survey 5-Year Estimates for watershed counties (via NOAA NOS Office of Coastal Management), and 2010 U.S. Census data for some island areas. Rounded to the nearest million.



See *How Great are the Great Lakes* video on review website.



# GLERL is in the research division of NOAA.





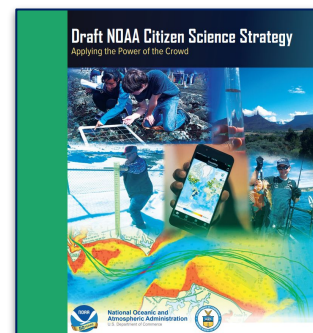
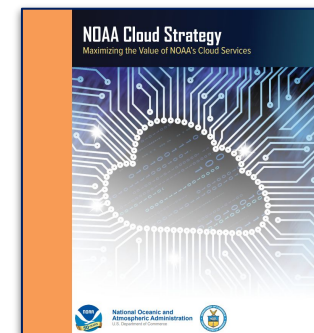
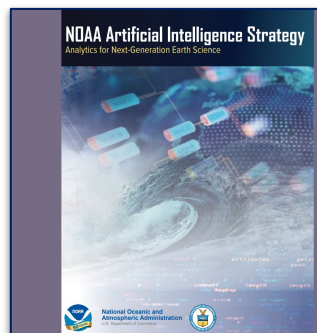
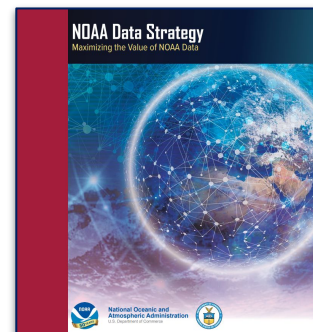
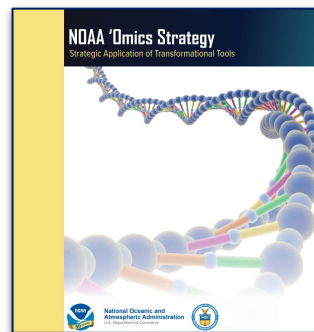
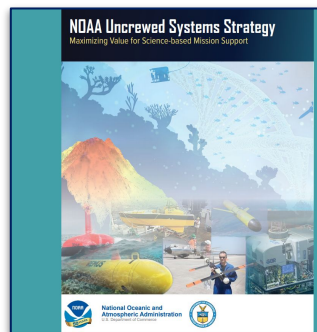


# GLERL works to support NOAA's Mission.

## NOAA's Mission: Science, Service and Stewardship

1. To understand and predict changes in climate, weather, oceans and coasts;
2. To share that knowledge and information with others; and
3. To conserve and manage coastal and marine ecosystems and resources

# GLERL is aligning with NOAA science strategies for accelerating innovation in the 21st century.





# NOAA Oceanic and Atmospheric Research (OAR) vision, mission, and goals aim toward delivering NOAA's future.

VISION: Deliver NOAA's Future

MISSION: Research, Develop, Transition – Conduct research to understand and predict the Earth system; develop technology to improve NOAA science, service, and stewardship; and transition the results so they are useful to society

## GOALS:



### Explore the Marine Environment

Define the characteristics of the ocean, coastal areas, and their resources for mission, management, and knowledge.



### Detect Changes in the Ocean & Atmosphere

Produce long-term observation records for NOAA's operational services; to identify changes in the Earth System and understand them.



### Make Forecasts Better

Improve accuracy of weather, water, ocean, and climate forecasts and predictions to support a vibrant economy and save lives and property.



### Drive Innovative Science

Deliver innovative research to advance NOAA's mission using the unique capabilities of NOAA's research community.





# GLERL's vision and mission align with OAR.



## Vision

### *Deliver NOAA's Future*

A trusted scientific enterprise to advance observation, modeling, understanding, and prediction of the Great Lakes and coasts to sustain resilient ecosystems, communities, and economies.



## Mission

### *Research, Develop, Transition*

Conduct research to understand and predict the Great Lakes and coastal ecosystems; develop technology to improve NOAA science, service, and stewardship; and transition the results so they are useful to society.

See *Strategic Planning* under "Documents" tab on review website.



# Congressional mandates drive government research priorities.

Great Lakes and Lake Champlain Invasive Species Program § 4730

Great Lakes Environmental Research Laboratory: Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1387

Harmful Algal Bloom and Hypoxia research: Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2014, 16 U.S.C. § 1451

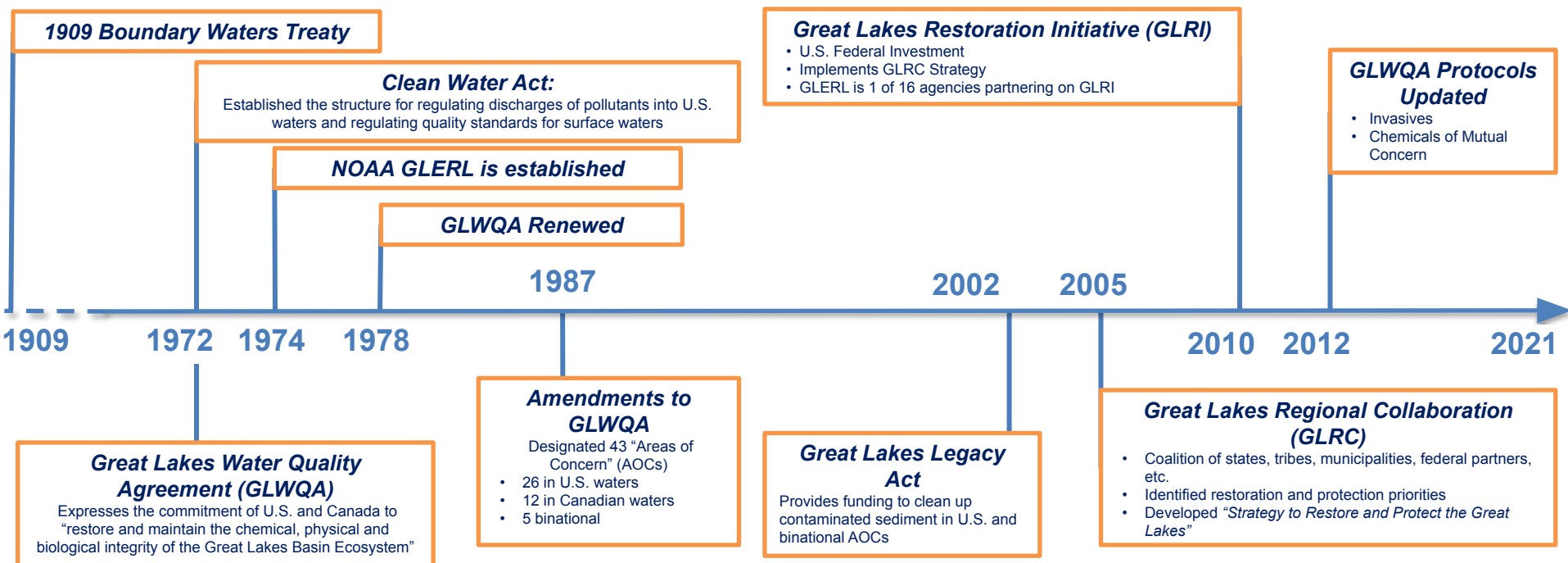
## **GLERL's Establishing Order**

Office of the Secretary [Dept. Organization Order 25-5B] NOAA Organization and Function, April 25, 1974 "The Great Lakes Environmental Research Laboratory shall conduct research directed toward an understanding of the environmental processes in the Great Lakes and their watersheds. Emphasis shall be placed upon an interdisciplinary systems approach to solving problems in resource management and environmental services for that region."

See "Documents" on review website: Appendix A in Strategic Plan 2021-2025.



# A century of efforts to protect and restore the Great Lakes



See *Service to Society: Interagency and Inter-Line Office Activities* under "Documents" tab on review website.



# GLERL's core competencies meet regional needs.

## Wind, Waves, Currents

Forecasting & Oil Spill Prediction



## Ice Cover & Water Levels

Research & Modeling



## Invasive Species & Food Webs

Research & Modeling



## Regional Fleet

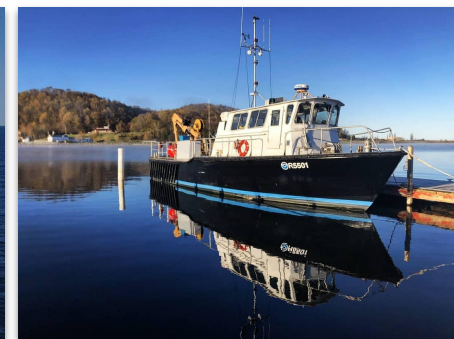
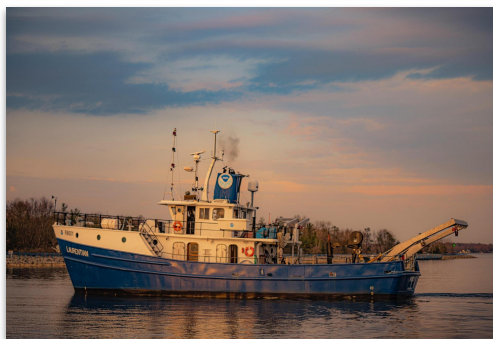
Management & Support

## Harmful Algal Blooms

Monitoring, Research, & Modeling

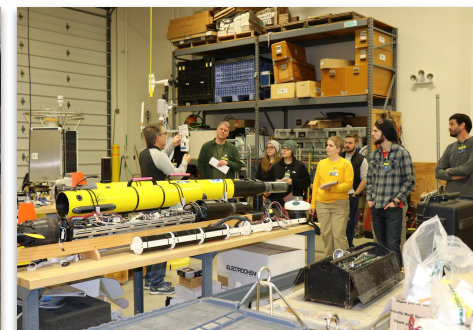


**GLERL facilities house state-of-the-art equipment and technology to support scientific research.**





# GLERL serves as both a physical and virtual hub for the Great Lakes region and the nation.

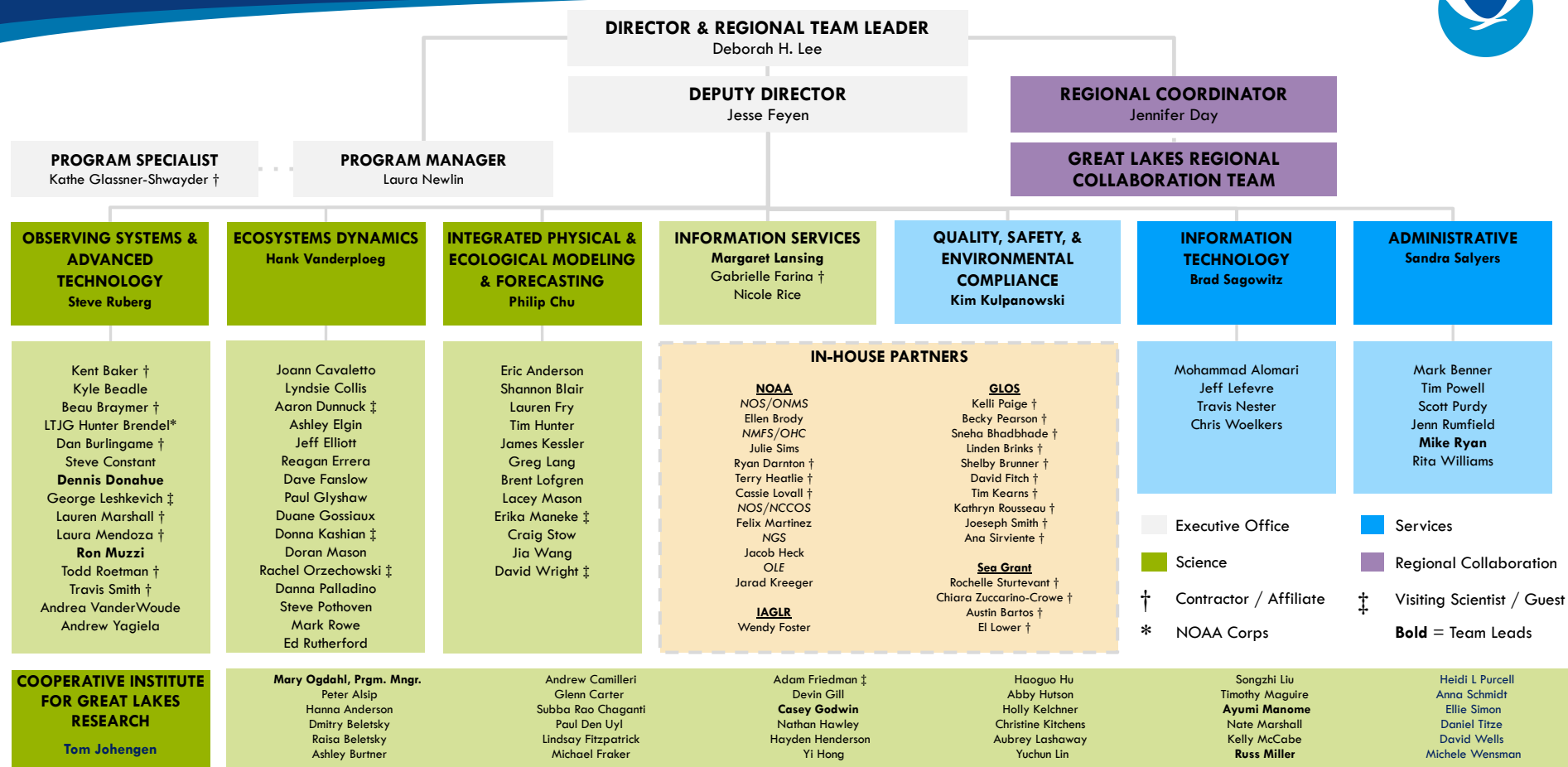


See "Documents" on review website.





## Workforce



# The NOAA GLERL – Cooperative Institute for Great Lakes Research collaboration is an essential aspect of GLERL's long-term success.



The Cooperative Institute for Great Lakes Research (CIGLR) is one of 16 NOAA Cooperative Institutes across the U.S. that conduct research in support of NOAA's mission and goals.

CIGLR is sponsored by the NOAA Great Lakes Environmental Research Laboratory (GLERL) and hosted by the University of Michigan.

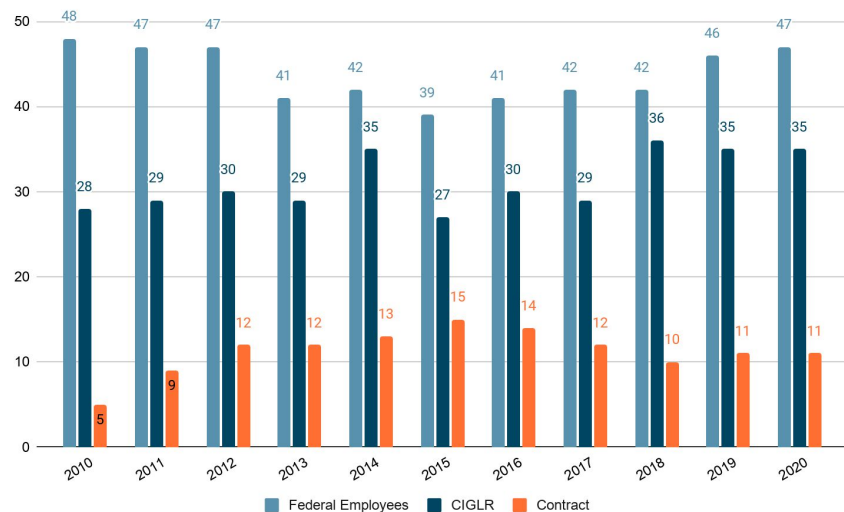
CIGLR Research Institute staff are housed at GLERL and complement our workforce with highly-skilled research scientists and staff that expand our research expertise.



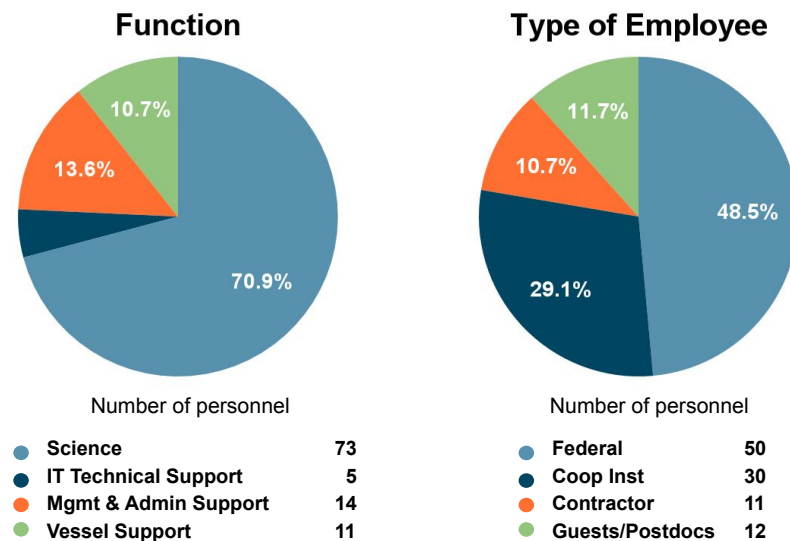


# GLERL Staffing Profile

2010 - 2020

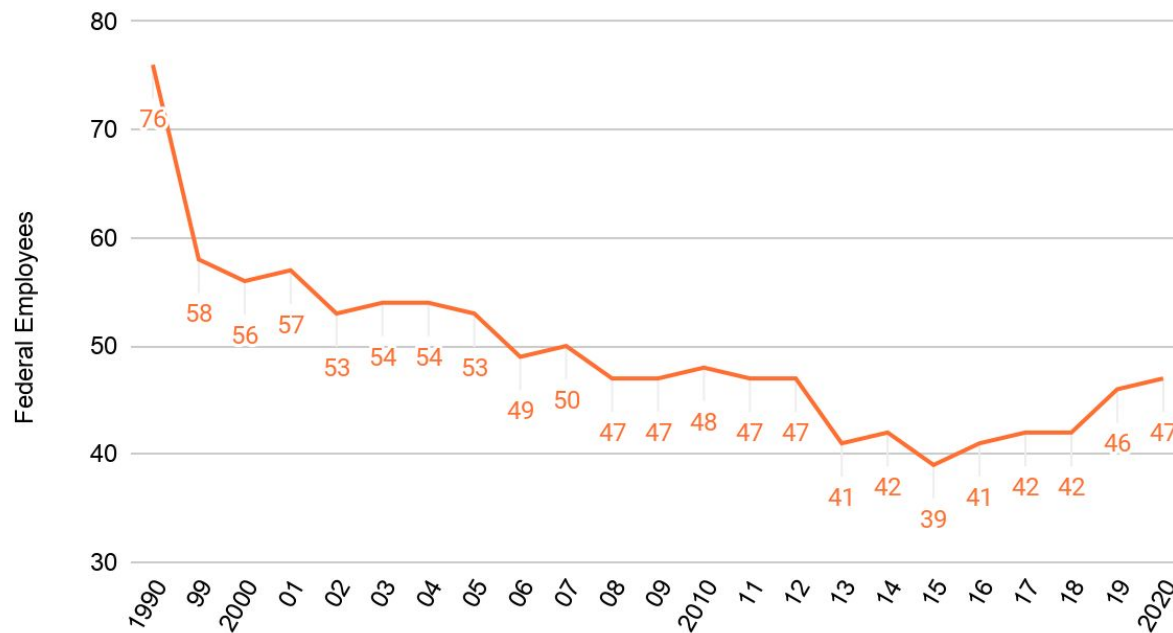


FY21 Staff Makeup



# Full Time Federal Employee Count

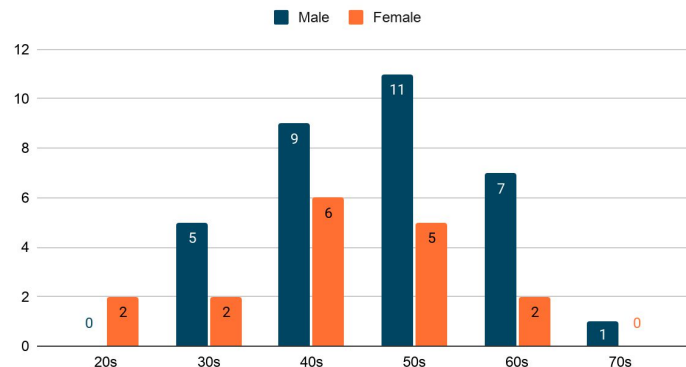
Federal Employees FTE Count



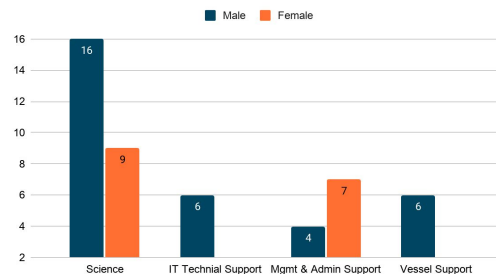


# Federal Staff Diversity

## Age and Gender



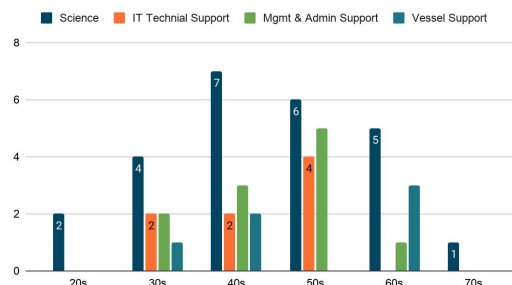
## Gender by Function



## Education

Education	
PhD	14
Masters	14
Bachelors	16
Other	6

## Age by Function



## Race

Ethnicity	
White/Caucasian	47
Asian	2
African American	1



# GLERL is enriched by diverse perspectives, celebrating each other's unique experience and expertise.

## GLERL hiring efforts aim to improve staff diversity.

Expanded the reach of internship announcements by using a platform called Handshake.com. We now reach every college and university within the United States.

Use of the Pathways Program to direct hire interns into the Federal Service.

GLERL's recent focus on diverse hiring has resulted in the hiring of:

- 3 female research scientists
- 1 female technical staff
- 3 Veterans

See *Commitment to Diversity and Inclusion* in Strategic Plan 2021-2026 on review website.

GLERL was the 2017 NOAA Research EEO/Diversity Award recipient.



## GLERL EEO, Diversity and Inclusion Committee activities include:

- Meet regularly to discuss EEO, D & I initiatives at GLERL.
- Host monthly diversity learning opportunities with all staff.
- Provide updates on NOAA D & I activities (included in weekly staff email).
- Host annual diversity potluck luncheon.

## GLERL leadership in EEO, D & I:

- OAR Diversity and Inclusion Advisory Committee (co-chair Nicole Rice; member Andrea VanderWoude).
- OAR EEO Advisory Committee (GLERL rep. Sandra Saylers; former members: Anne Clites, Doran Mason).



# GLERL fosters the future environmental workforce.

## GLERL/CIGLR Summer Fellows Program

To boost efforts toward developing a diverse scientific workforce, we coordinated significant improvements to the program in 2020 to remove barriers to participation by students from underrepresented groups, including an increased stipend intended to cover the cost of housing and other living expenses.

In 2020, 78% of the accepted fellows identified as having “socioeconomic challenge.”

### Program highlights:

- 2016-2020: GLERL mentored 45 fellows.
- Applicants in 2016=58, applicants in 2020=171
- 1998 to present: 344 fellows mentored with 10 ultimately hired by CIGLR and 3 are now federal employees at GLERL.

See *Service to Society: Mentoring* under “Documents” tab on review website.



### Additional hosting and mentoring activities at GLERL:

- NOAA Pathways Program Interns
- NOAA Hollings Scholars and NOAA Knauss Fellows
- José E. Serrano Educational Partnership Program with Minority Serving Institutions (NOAA EPP/MSI)
- NOAA Cooperative Science Centers, particularly the Center for Coastal and Marine Ecosystems (CCME) hosted by Florida A&M University (hosted two CCME interns).
- CIGLR postdoc and graduate research fellows
- High school and college students
- Serving as adjunct faculty
- Thesis committees

# GLERL management encourages workforce training and development opportunities.

All Federal staff have an Individual Development Plan (IDP) - updated annually as part of performance evaluation process.

1.5% of GLERL labor costs are dedicated to training annually.

During the 2016-2020 review period, GLERL staff participated in:

- Lantern Program (Formerly the NOAA Rotational Assignment Program)
- Asian American Government Executive Network (AAGEN) Senior Executive Service Development Program
- Hearts of GOLD (Geosciences Opportunities for Leadership in Diversity)
- Office of Personnel Management Leadership Competencies Development Program
- NOAA six-month details, serving in another NOAA office



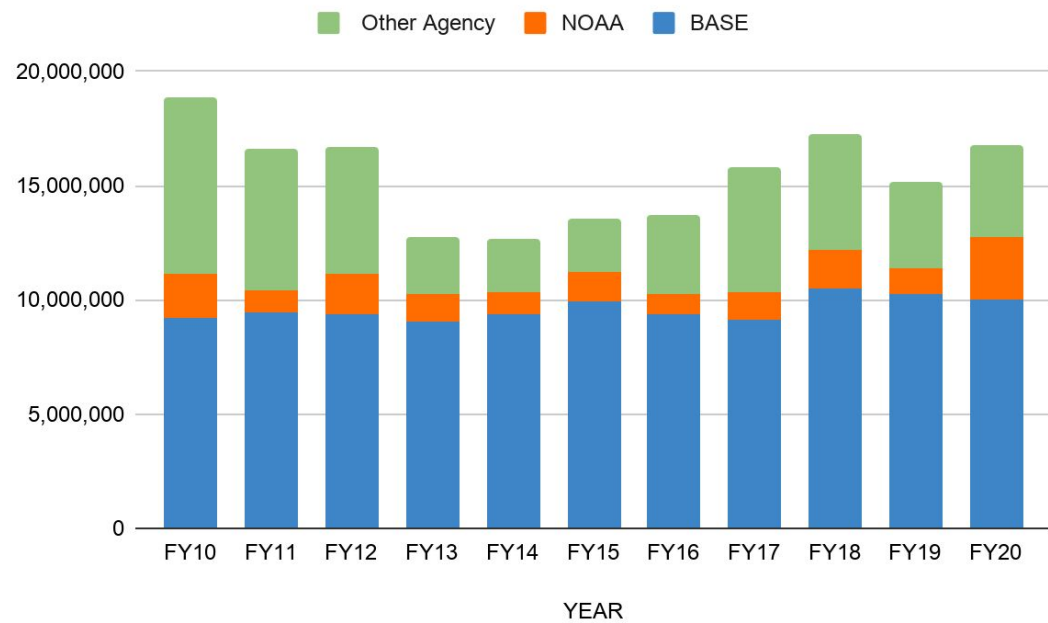


## Funding / Budget



# 10-Year Funding Profile FY10-FY20

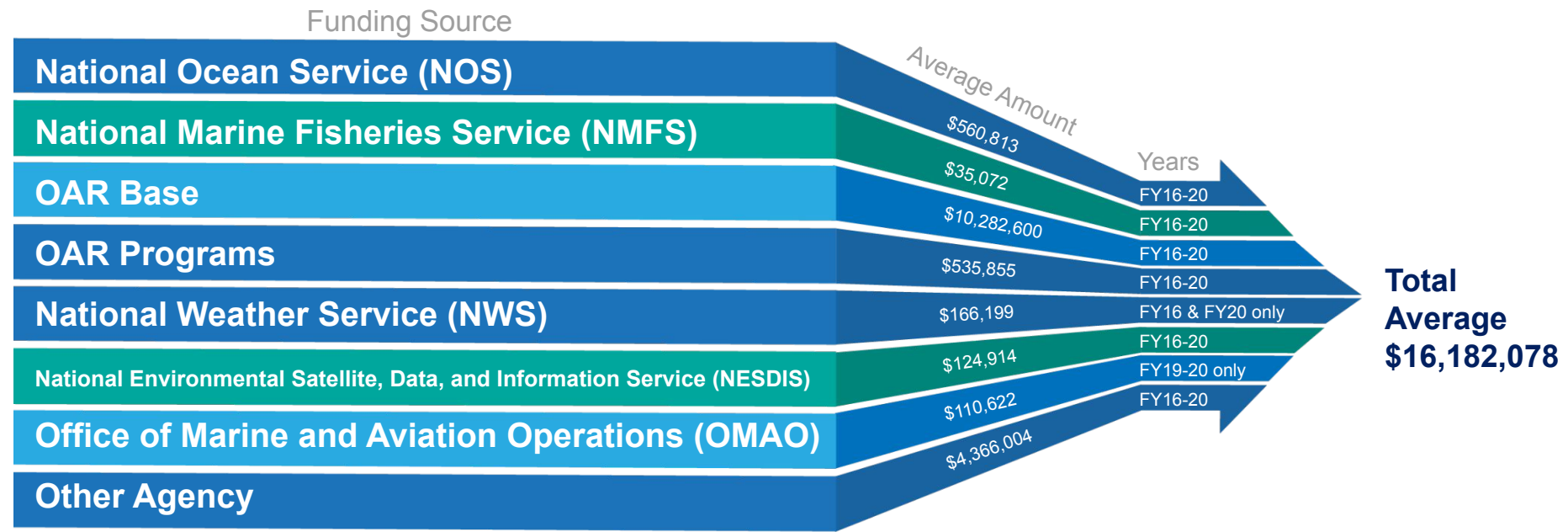
Income by Source (\$ in thousands)







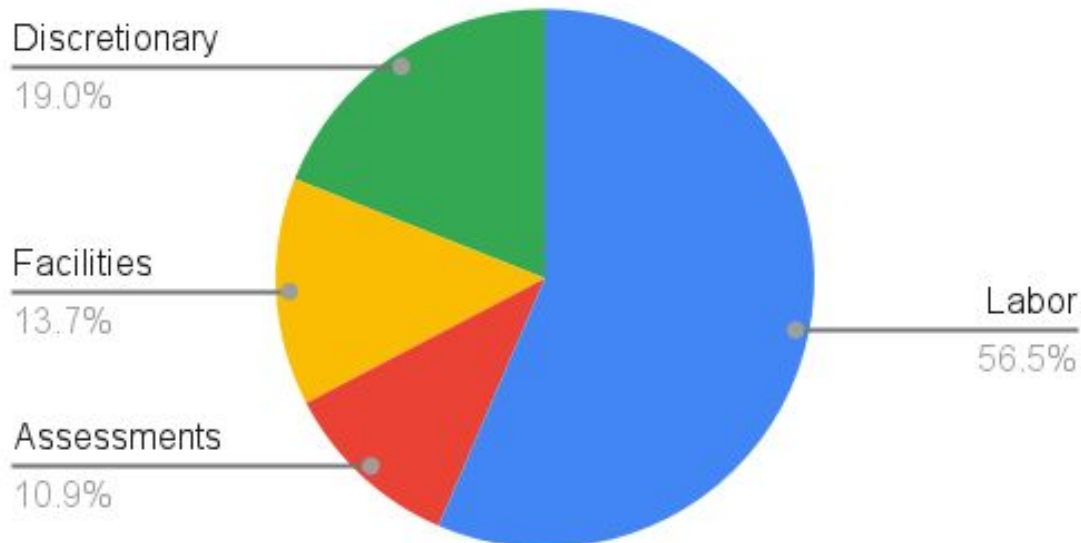
# Total funding by source 2016-2020





## Base Average 2016-2020 - \$10.3M

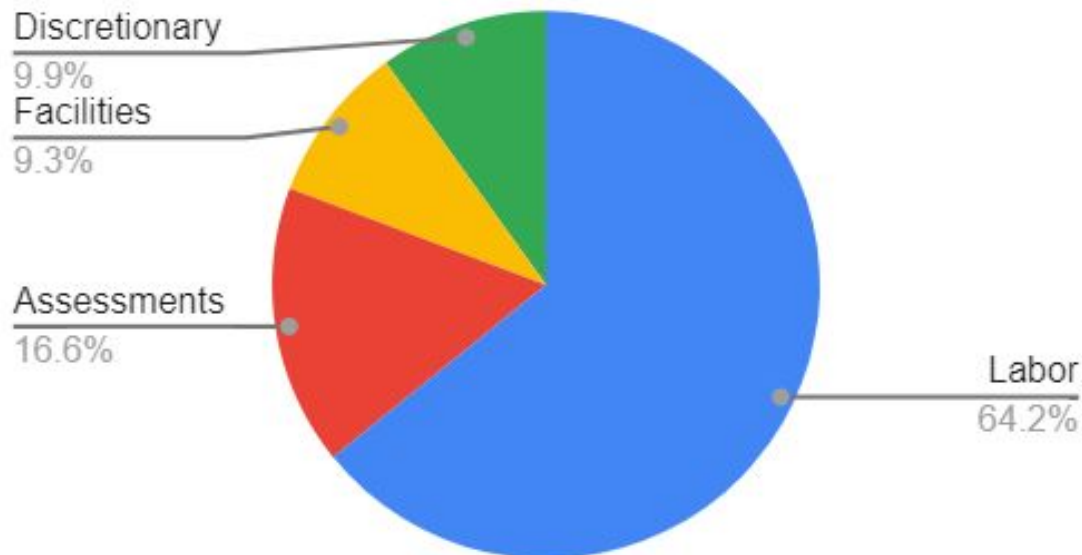
**FY16**





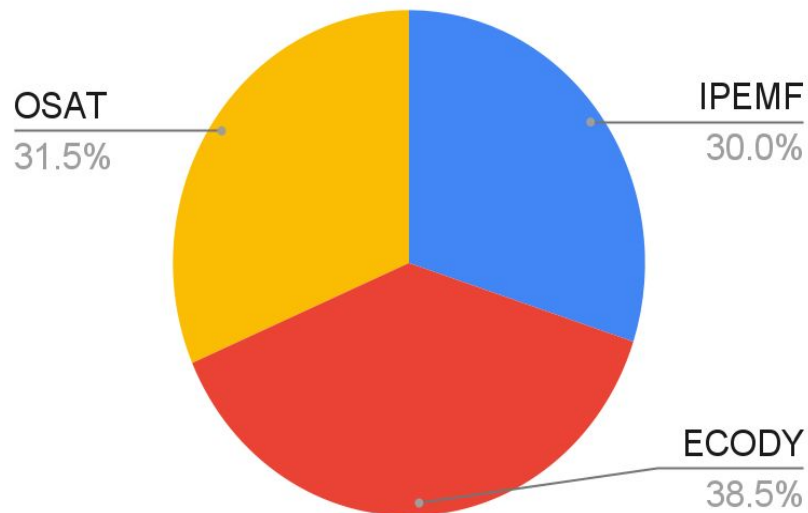
## Base Average 2016-2020 - \$10.3M

**FY20**

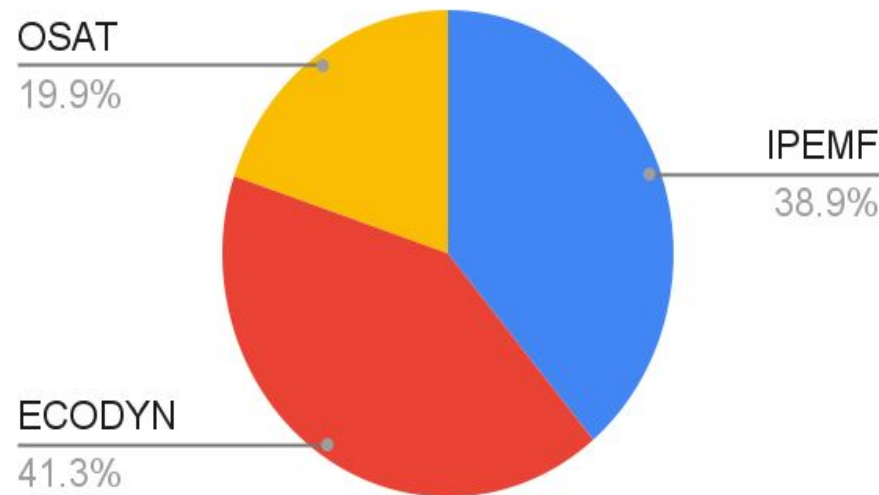




## FY16-20 Base Science Expenditures - \$5.8M Avg



## FY16-20 Other NOAA & Reimbursable Expenditures - \$4.3M Avg





# The Great Lakes Restoration Initiative (GLRI)



**Collaboration between 16 federal agencies working with states, tribes, municipalities, universities, and NGOs.**

- **Over \$3.8 billion allocated across all agencies since 2010.**
- **Guided by the GLRI Action Plan II which outlines work under five Focus Areas:**

- ❖ **Toxic Substances and Areas of Concern (AOC)**
- ❖ **Invasive Species**
- ❖ **Nonpoint Source Pollution Impacts on Nearshore Health, Habitats and Species**
- ❖ **Foundations for Future Restoration Actions**



**Over 380 NOAA projects funded.**

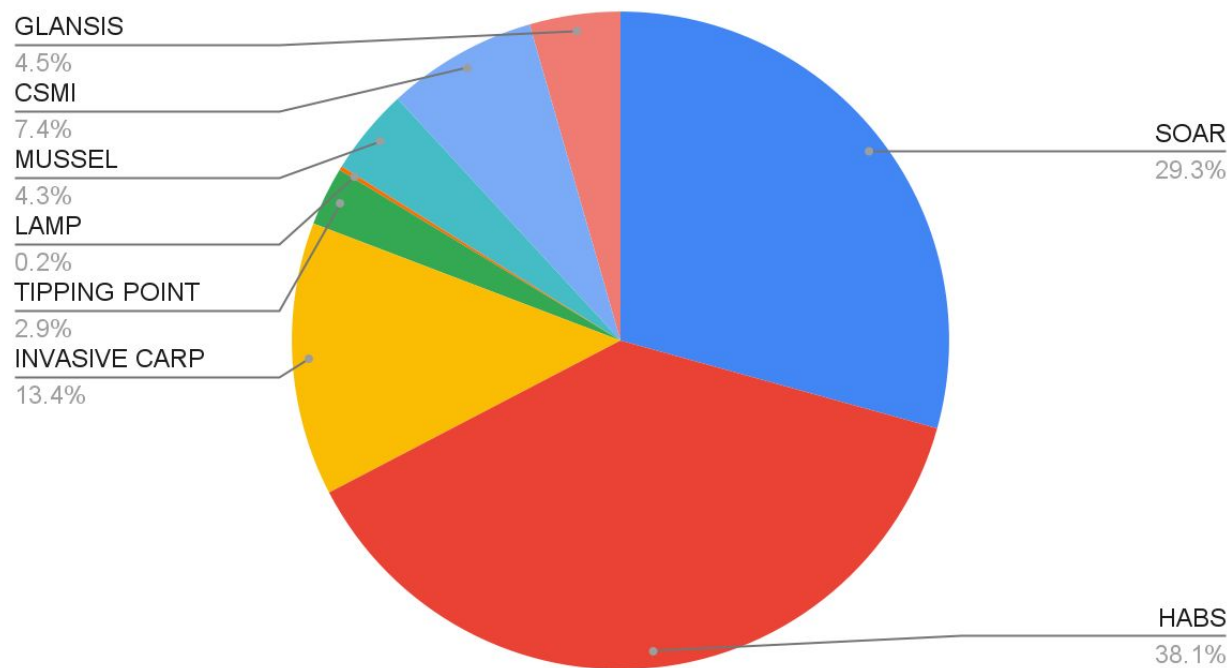


**\$244 million allocated to NOAA.**



# Great Lakes Restoration Initiative - 2016-2020

## Funding Distribution by Project





## Research Leadership and Planning

*Photo: GLERL Director Deborah Lee with Deputy Under Secretary for Operations Benjamin Friedman*



# GLERL addresses societally relevant needs.

## NOAA Great Lakes Environmental Research Laboratory



### Strategic Plan 2016-2020

*A commitment to integrated scientific research on the Great Lakes and coastal ecosystems*

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
Office of Oceanic and Atmospheric Research



## NOAA Great Lakes Environmental Research Laboratory



### STRATEGIC PLAN 2021-2025

15

## GOALS AND STRATEGIC OBJECTIVES

Four goals reflect what OAR desires to achieve, where to focus activities, and, ultimately, how to improve the organization's ability to deliver NOAA's future. The objectives, nested under each goal, are the areas of focus needed, and where GLERL is aligning to help OAR achieve its goals.

1

### Explore the Marine Environment

Increase knowledge of the Great Lakes and the regional water budget to support resource management and public awareness.

2

### Detect Changes in the Ocean (Great Lakes) and Atmosphere

Produce, analyze, and interpret observation records to understand the Earth system with a regional focus of the Great Lakes and inform the public.

3

### Make Forecasts Better

Improve accuracy, precision, and efficiency of forecasts and predictions to save lives and property and support a vibrant economy.

4

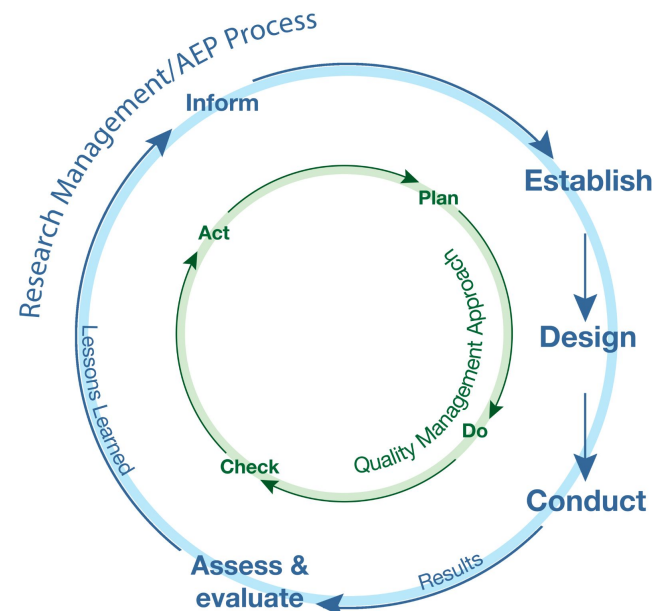
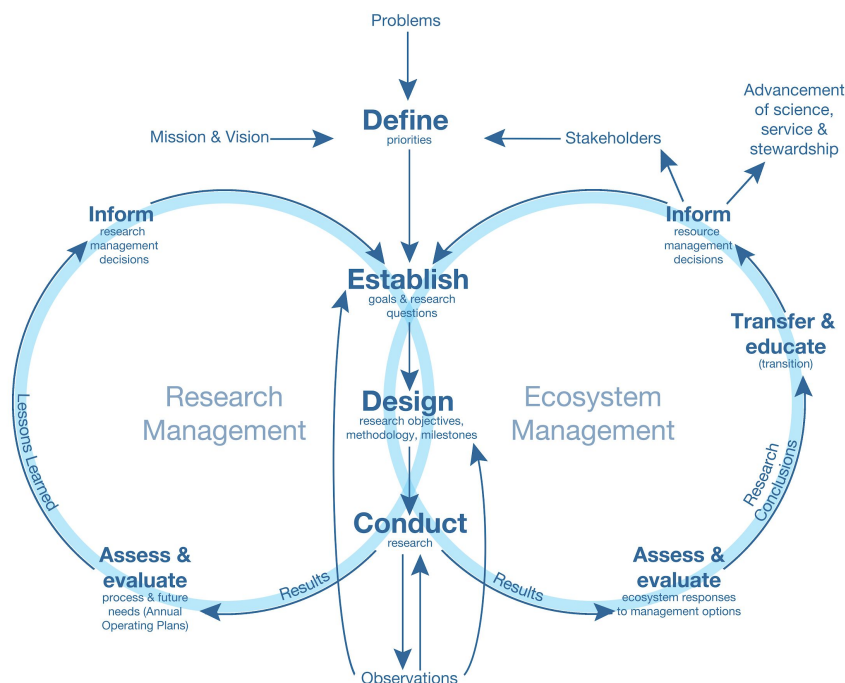
### Drive Innovative Science

Cultivate and deliver mission-relevant research to lead the environmental science community.

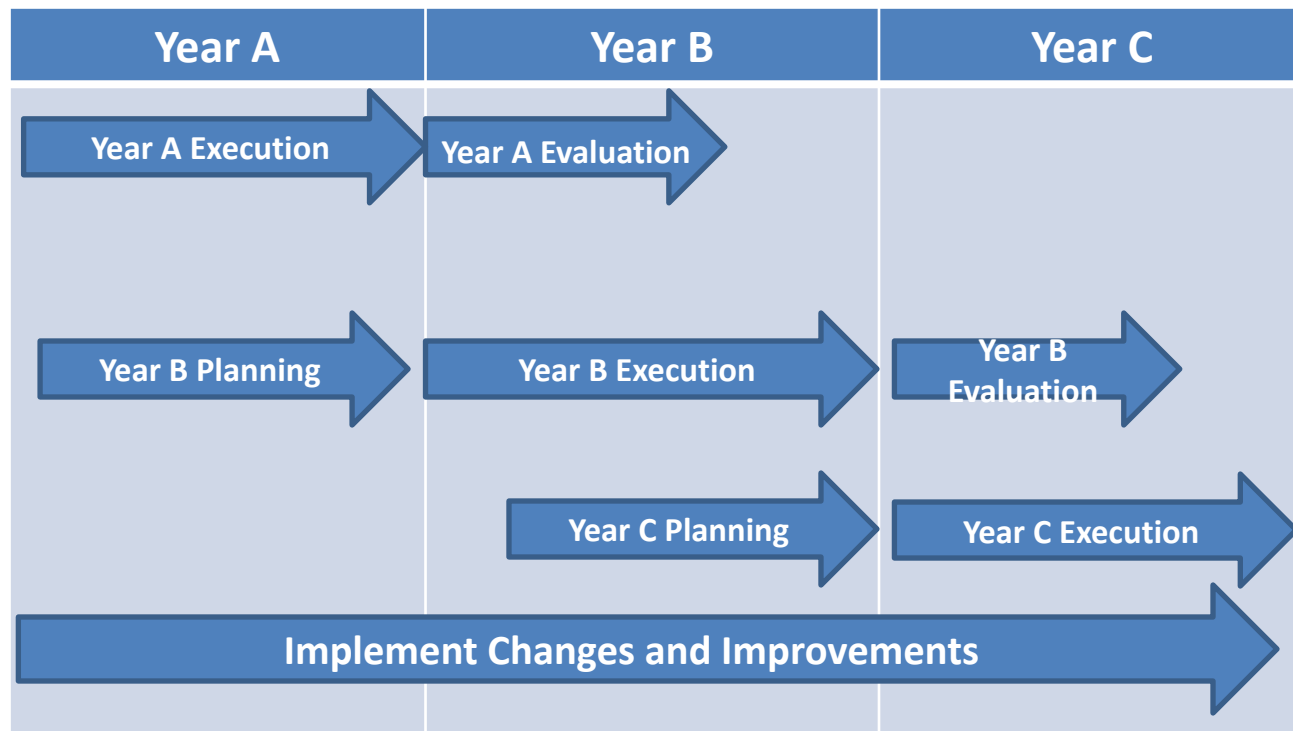
*"Conduct research to understand and predict the Great Lakes and coastal ecosystems; develop technology to improve NOAA science, service, and stewardship; and transition the results so they are useful to society."*

See *Strategic Planning* under "Documents" tab on the review website.

# GLERL's approach to adaptive research management helps to establish research goals, questions and drivers.



# The Annual Execution Plan (AEP) process guides GLERL to execute research in an efficient and effective manner each year.



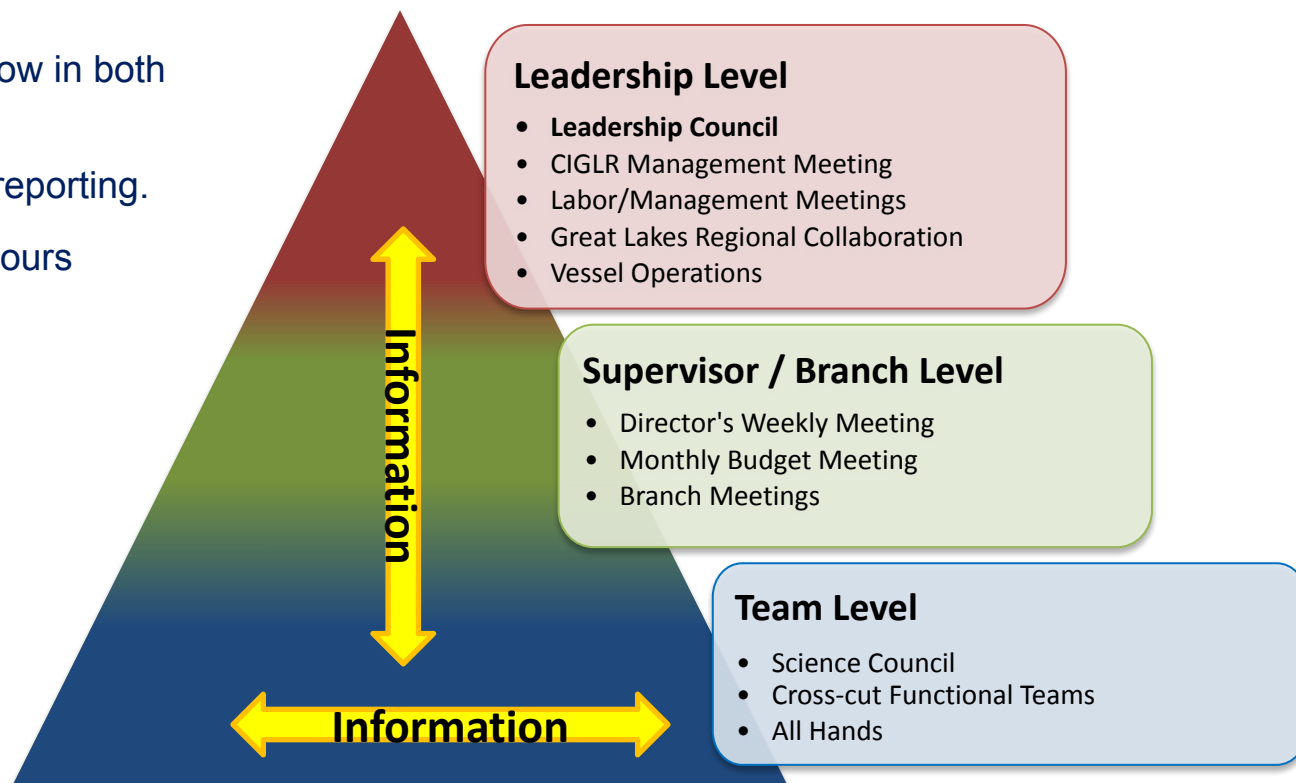
## GLERL processes:

[illegible]

- Annual Execution Planning of internal and external projects which includes evaluation processes and continuous improvement efforts.
- Annual GLERL project data management plans.
- Projects tracked in the NOAA Research and Development Database  
*A web-based tool containing information about R&D projects conducted & funded by NOAA.*
- External proposal tracker for new funding opportunities.
- Coordination with Cooperative Institute (CIGLR) on funding opportunities.
- Participation in OAR research portfolios and cross-line funding teams.

# GLERL in-house science processes encourage information flow.

- Vertical Information flow in both directions.
- Eliminates repetitive reporting.
- Reduces total labor hours spent in meetings.



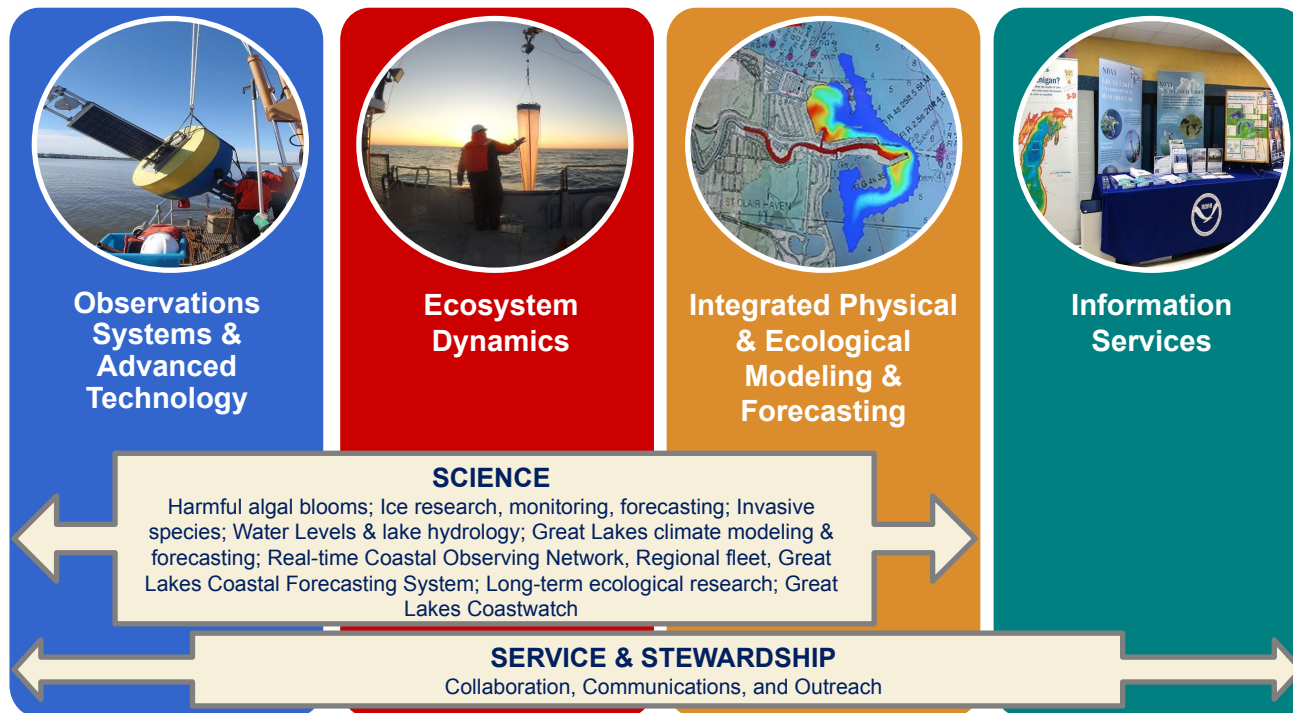




## **The GLERL Science Council provides a forum for envisioning science direction.**

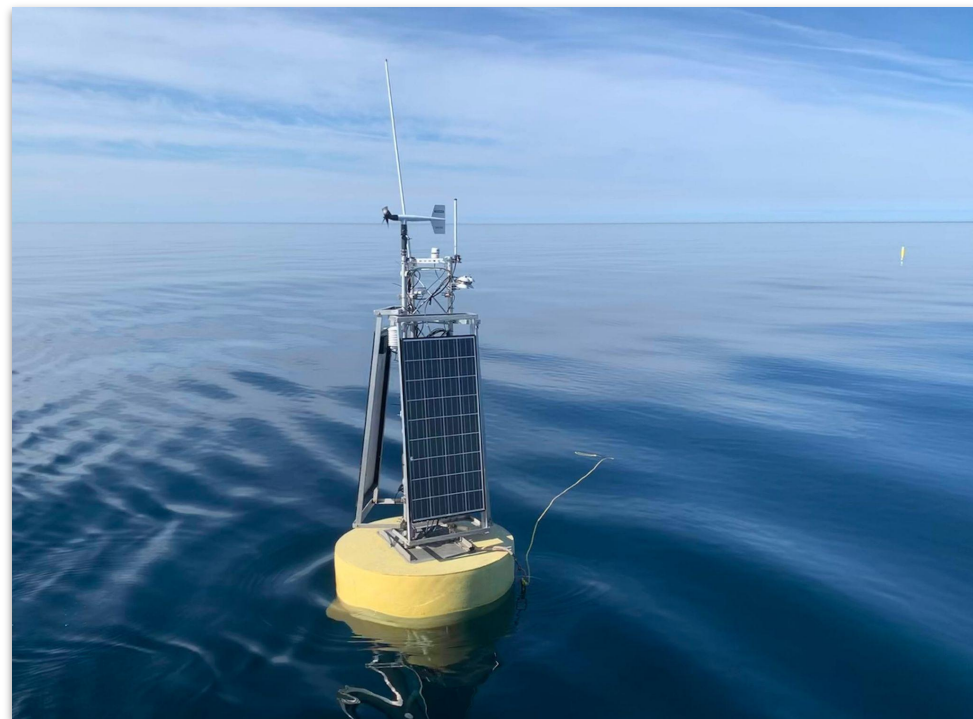
- Provide strategic research guidance at GLERL across the three year planning cycle, focusing on large, integrated research and transition products.
- Provide recommendations and advice to GLERL leadership on science direction, formation of focused working groups, and specific science projects to pursue. Recommendations will be made by consensus of the council. If consensus cannot be reached, the council will agree to disagree with the minority opinion being noted for consideration.
- Align research recommendations with goals and objectives from the DOC Strategic Plan, NOAA 5-year Research Plan, NOAA Annual Guidance Memo, OAR Strategic Plan, the GLERL Strategic Plan, and the GLERL Laboratory Review.

# GLERL is uniquely organized to maintain its integrated scientific research program.



## Observing Systems and Advanced Technology (OSAT)

GLERL's Observing Systems and Advanced Technology (OSAT) branch conducts scientific and engineering research and development, identifies emerging observational infrastructure needs, and provides environmental observations and data throughout the Great Lakes.



## Ecosystem Dynamics (EcoDyn)

The Ecosystem Dynamics (EcoDyn) branch strives to monitor, analyze, understand, and predict changes in Great Lakes and coastal ecosystems to strengthen capacity for managing water quality, fisheries, invasive species, and ecosystem health.



# Integrated Physical and Ecological Modeling and Forecasting

The Integrated Physical and Ecological Modeling and Forecasting (IPEMF) branch conducts innovative research and development of numerical models to predict the physical, chemical, biological, and ecological response of the Great Lakes due to weather, climate, and human-induced changes.

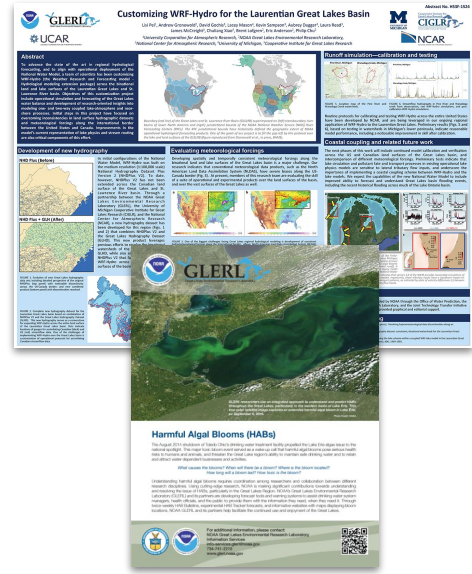
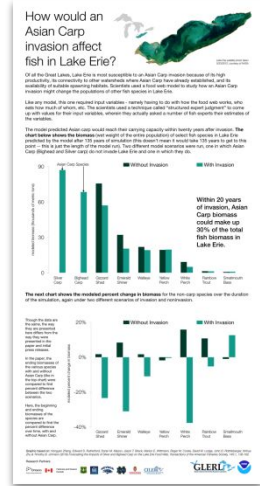






# Information Services

The Information Services branch coordinates and supports information flow internally among staff, throughout NOAA, and externally with stakeholders and the general public to advance science, service, and stewardship of the Great Lakes and coastal ecosystems.





**QUALITY:** Assess quality of GLERL's R&D

**RELEVANCE:** Assess GLERL's R&D relevance to NOAA's mission & value to Nation



**PERFORMANCE:** Assess overall effectiveness of GLERL's plans & R&D in meeting NOAA's Strategic Plan objectives & Nation's needs

## Indicators of Excellence

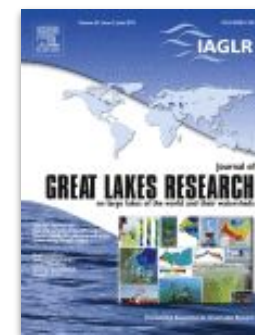
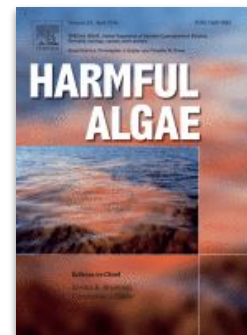


## The quality of GLERL's science is reflected in its publications.

### Bibliometrics: Summary Metrics for Jan 2016 - Dec 2020

Indicator	Number
Total number of publications	192
Total number times of these 192 publications have been cited	2,581
Average citations per publication	13.44
Percentage of documents cited at least once	91%
GLERL H-index	27
Percentage of documents in the top 10%*	16.2%

### Special publications co-edited by GLERL PIs



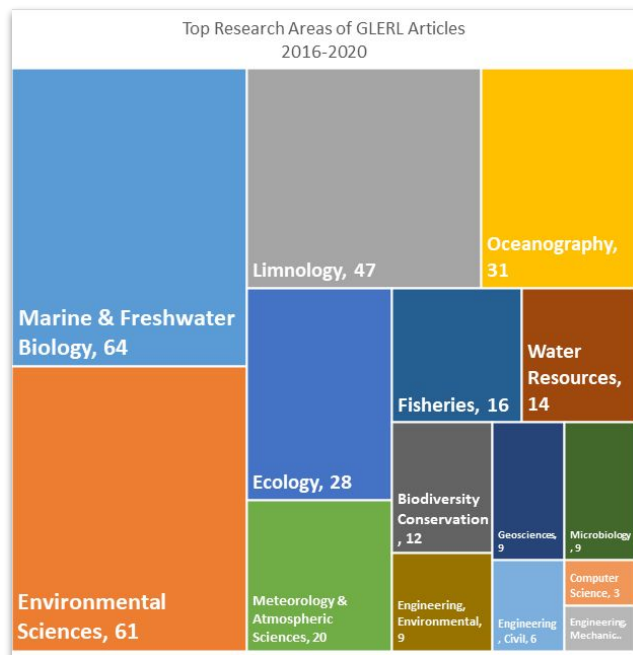
See review website "Documents" tab for a full list of 2016-2020 GLERL publications and the bibliometric report.

See GLERL publications web page for all GLERL publications  
<https://www.glerl.noaa.gov/pubs/>

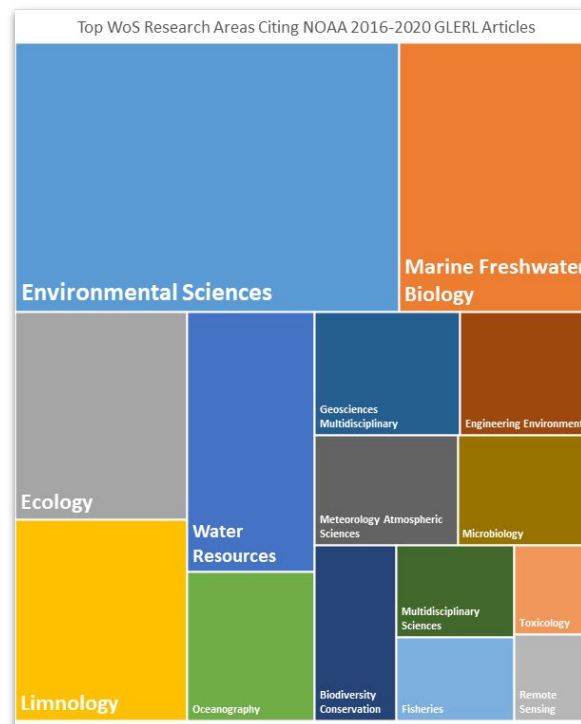


**QUALITY:**  
Assess quality  
of GLERL's R&D

## The GLERL publication record reflects a collaborative multidisciplinary approach to addressing complex environmental challenges.



From pages 7 and 13 of  
Bibliometric Report on  
GLERL review website.





## GLERL staff were recognized for high achievement during 2016-2020.



Dr. Eric J. Anderson - 2019

### Presidential Early Career Award

*The PECASE Award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers.*



### Department of Commerce: 2 Gold and 3 Bronze Medals

*For extraordinary achievements in support of the critical objectives of the Department of Commerce with a significant beneficial effect on the Nation or world.*

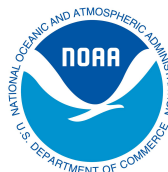


### Gears of Government Award

*Recognizes individuals and teams across the Federal workforce whose dedication supports exceptional delivery of key outcomes for the American people.*

### 2 Silver Sherman Awards

*Recognizes NOAA employees who excel at their jobs, achieve a milestone that contributes significantly or critically towards a particular program's goal, or demonstrate leadership toward process improvement of a significant magnitude.*



### Distinguished Career Award

*Recognizes those who have contributed a significant body of professional work and who have helped achieve NOAA's mission over the course of their careers.*

### Sustainability, Energy, and Environmental Ambassador Award

*Recognizes individual Departmental employees for their outstanding performance in implementing exceptional cost-saving projects and/or programs that help the Department achieve its mission to improve energy efficiency, water conservation, environmental performance and awareness.*

See Awards & Honors in the "Documents" tab on review website for more.





**RELEVANCE:**  
Assess GLERL's  
R&D relevance to  
NOAA's mission &  
value to Nation

**GLERL provides subject matter expertise and promotes synergy and connectivity among local, regional, national, and international partners.**

- Leadership and service on international and regional committees
- Leadership on regional, national, and bi-national state-of-science assessments
- Leadership and service on NOAA teams and committees
- Journal reviewers, guest editors, editorial boards
- Professional society leadership and membership



See *Service to Society* documents on review website.



**RELEVANCE:**  
Assess GLERL's  
R&D relevance to  
NOAA's mission &  
value to Nation

## GLERL science informs policy decisions.

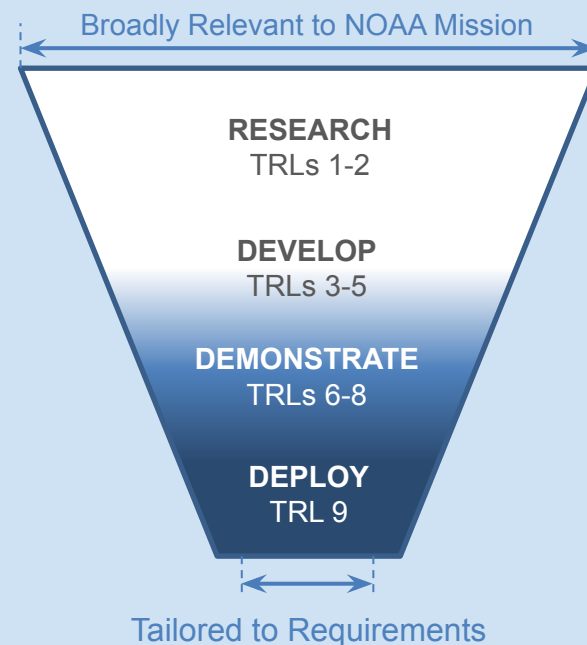
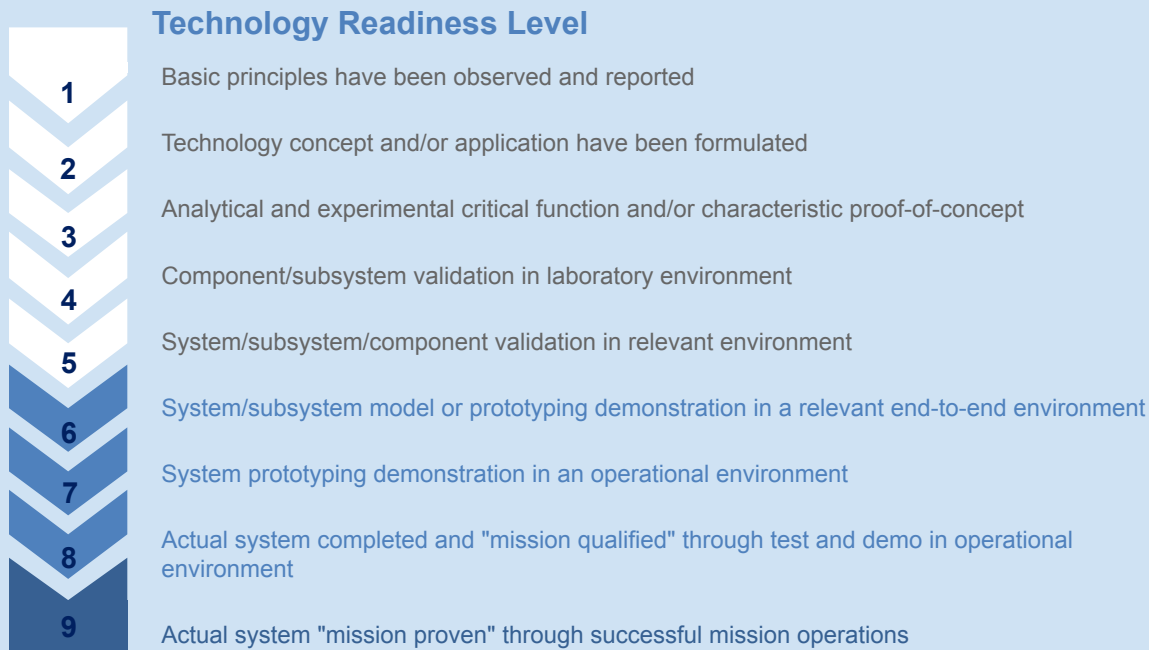
### Policy

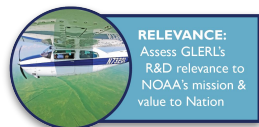
### GLERL Contribution

Great Lakes Water Quality Agreement	↔	Serve on Executive Committee and Lakewide Management Committees,
Harmful Algal Bloom and Hypoxia Research and Control Act	↔	Led the development of the Congressionally mandated science assessment of Harmful Algal Blooms in the Great Lakes.
International Joint Commission	↔	Developing a new flood forecast system for Lake Champlain – Richelieu River.
Invasive Mussel Collaborative	↔	Providing intelligence on the mussel ecology, distribution, and impact on the food web and fisheries.
Great Lakes Restoration Initiative	↔	As one of 16 major federal partners NOAA has completed \$244 million of restoration efforts through the leadership of the NOAA Great Lake Regional Collaboration Team.
Great Lakes Fishery Commission	↔	Annually provide data and information to the Lake Michigan Technical Committee on the lower food web.

See *Service to Society* documents on review website.

## GLERL collaborates with partners to transfer the product outcomes of research and development for application and operational use by stakeholders.



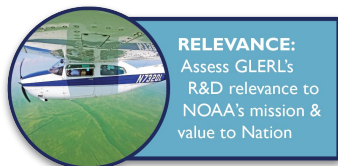


# R2X: Research to Operations & Applications 2016-2020

Transitioned	To
Lake Erie Operational Forecasting System	NOAA/NOS/CO-OPS
Great Lakes Coastal Forecast System Lakes Michigan-Huron	NOAA/NOS/CO-OPS
Great Lakes Coastal Forecast System Lake Superior	NOAA/NOS/CO-OPS
HAB hyperspectral mapping & detection products	NOAA/NOS/NCCOS
Great Lakes Color Producing Agent (CPA) Algorithm	NESDIS/STAR
SAR ice type classification	NOAA/NWS, U.S. Coast Guard, U.S. National Ice Center
National Water Model Lake Champlain Upgrade	NOAA/NWS/River Forecast Centers
Short-term flow forecasting for the Niagara River	New York Power Authority/Ontario Power Generation
National Water Model Great Lakes and Lake Champlain Upgrades	NOAA/NWS/River Forecast Centers
Lake Erie HAB Forecast 3D Model Upgrade	NOAA/NOS/CO-OPS
Illinois River EcoSim Model for Invasive Carp Effects	Great Lakes Fishery Commission / U.S. Army Corps of Engineers

See "Documents" on review website.

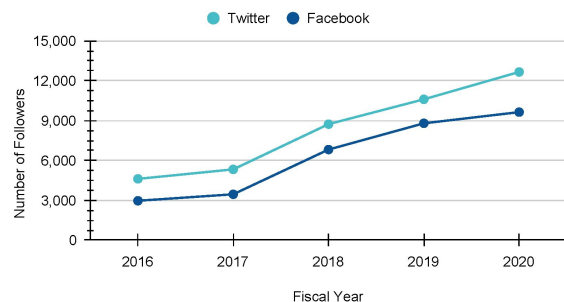




**RELEVANCE:**  
Assess GLERL's  
R&D relevance to  
NOAA's mission &  
value to Nation

## Expanding the reach of GLERL research through media, outreach and education programming and products.

- Online: GLERL produces a variety of science translation products, such as: GLERL newsletters, blog posts, factsheets, infographics, & lake by lake profiles. (See "Education" section of GLERL website).
- In person: GLERL participates in educational events and initiatives that help to cultivate a science-informed society, such as: community tabling and speaking events, hosting college classes for tours and presentations, K-12 school visits.
- Media: GLERL subject matter expertise is regularly sought for news articles by international, national and regional outlets, resulting in hundreds of online, print, video, and radio news items every year.
- Social Media program: The GLERL social media program expands our reach and connects directly to stakeholders through Twitter, Facebook, Flickr, YouTube, Wordpress and Instagram.



International Association for Great Lakes Research: Lifetime Achieve Award recognizing important and sustained efforts to inform and educate the public and policymakers on Great Lakes issues, thereby raising awareness and support for Great Lakes protection and restoration.

See *Service to Society: Outreach and Education* document on review website.



**RELEVANCE:**  
Assess GLERL's  
R&D relevance to  
NOAA's mission &  
value to Nation

## Congressional engagement raises awareness of NOAA's Great Lakes mission.

- Great Lakes Week on Capitol Hill
- Congressional roundtables
- Regional district staff and member visits
- Congressional testimony
- Hosting staffers and congressional members at Ann Arbor and LMFS facilities

### Responsive to issues of concern to the Great Lakes Task Force:

- Invasive Carp Regional Coordinating Committee
- Harmful Algal Bloom and Hypoxia Research Control Act (HABHRCA)



In addition to NOAA visits to members of Congress up on Capitol Hill (top left), members and their staff often visit GLERL facilities. Seen here (top to bottom right), Deborah Lee gives Rep. Debbie Dingell (MI-12) a tour of GLERL's High Bay, a Congressional staffer speaks with Steve Ruberg in the benthic lab, and (bottom) Andrea VanderWoude discusses hyperspectral research with Senator Gary Peters of Michigan.



See *Service to Society: Congressional Engagement* document on review website.



## Supporting NOAA's Mission in the Great Lakes and Beyond

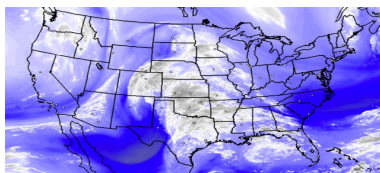




## GLERL collaboration across NOAA line offices improves NOAA operational forecasting capabilities.

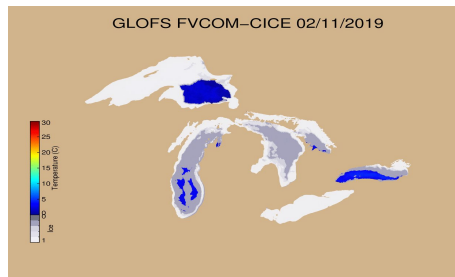
### Lake Effect Snow Forecasting

High-Resolution Rapid Refresh  
(HRRR) version 4 (operational Dec 2020)

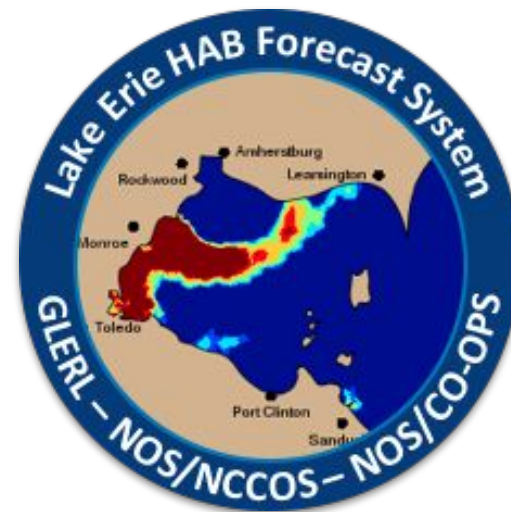


Surface meteorology

Water  
temperature  
Ice concentration  
Ice temperature



### Lake Erie Harmful Algal Bloom Forecast



Partners: GLERL - OAR Global Systems Laboratory (GSL) - NWS National Centers for Environmental Prediction (NCEP) - NWS National Ice Center (NIC) - NOS Center for Operational Oceanographic Products and Services (CO-OPS)



## Interaction with Great Lakes stakeholders drives research and development needs.

- Co-produce research products to meet stakeholder information needs.
- Collaborative stakeholder engagement program that reaches more than 1,400 stakeholders through workshops, interviews, and focus group meetings.
- Facilitate communication between scientists and stakeholders.
- Stakeholder groups include federal agencies (e.g. U.S. Coast Guard) public water system personnel, anglers, public health professionals, natural resource managers, and ship captains.

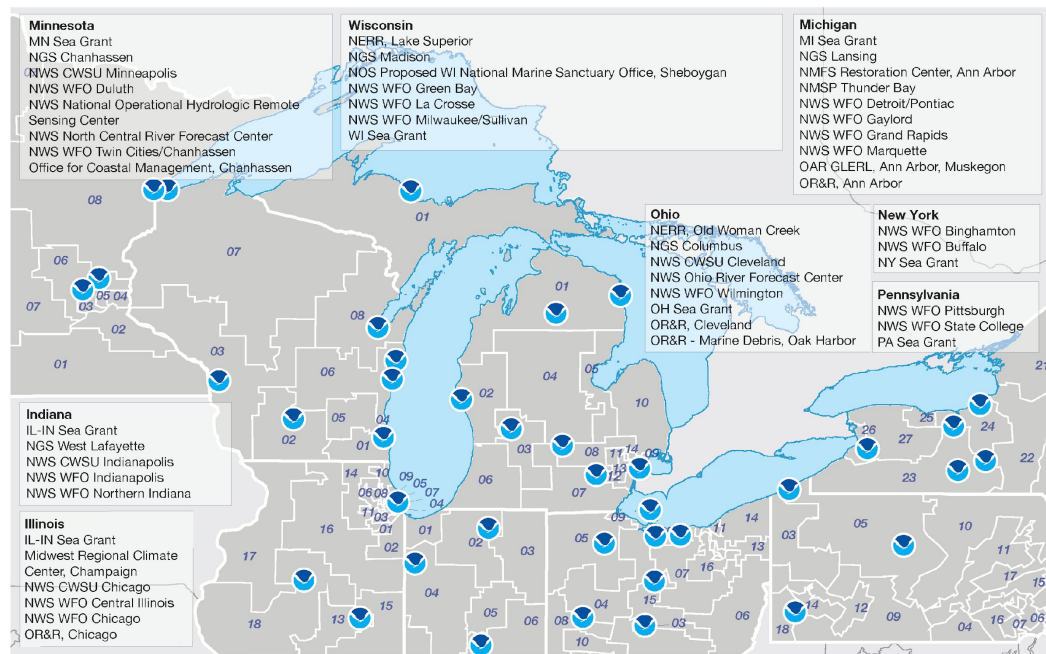






**PERFORMANCE:**  
Assess overall effectiveness of GLERL's plans & R&D in meeting NOAA's Strategic Plan objectives & Nation's needs

## NOAA Great Lakes Regional Collaboration Team: Coordinating across NOAA Line Offices to serve Great Lakes stakeholders.



Mission: To identify, communicate, and respond to regional needs, catalyze collaboration, and connect people and capabilities to advance NOAA's mission and priorities.

Debbie Lee serves as the NOAA Great Lakes Regional Collaboration Team leader.

See *NOAA in the Great Lakes* video on review website.



# In House Partners: Great Lakes Sea Grant Network (GLSGN) and Great Lakes Observing System (GLOS)

The GLSGN is comprised of 8 Great Lakes programs and plays a central role in supplying the region and the nation with usable solutions to pressing problems by providing the basic information needed to better manage Great Lakes resources for present and future generations of Americans. Five Sea Grant staff are co-located at GLERL, including the GLSGN Liaison.



GLOS is one of 11 Regional Associations of the Integrated Ocean Observing System (IOOS), working to enhance the ability to collect, deliver, and use ocean and Great Lakes information. IOOS is a partnership among federal, regional, academic and private sector parties that work to provide data for tools and forecasts to improve safety, enhance the economy, and protect our environment.

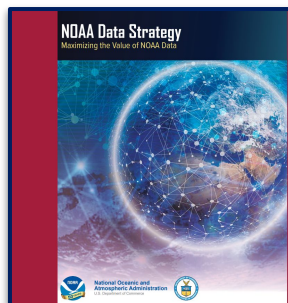




# GLERL personnel support NOAA-wide programs.



NOAA Small Boat Small Boat Safety Board Member and Line Office Small Boat Officer for OAR - Dennis Donahue



NOAA Environmental Data Management Committee Co-chair of the NOAA 2020 Environmental Data Management Workshop, NOAA Data Strategy co-author, alternate representative for OAR - Lacey Mason



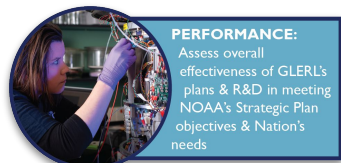
Senior Research Council's Operations and Management Working Group - Deborah Lee, member. Hosted budget team meeting at GLERL LMFS in 2018.



NOAA Research and Development Database (NRDD) - Kathe Glassner-Shwayder



NOAA Publications Tracking System (RPTS) - Nicole Rice



## Research partnerships and collaboration advance Great Lakes science and technology.



See "Partnerships" page on GLERL website at [www.glerl.noaa.gov/about/partnerships.html](http://www.glerl.noaa.gov/about/partnerships.html).







## New public-private partnership with Viking Expeditions supports NOAA goal to embrace transformative advances in science and technology.

GLERL and Viking Expedition LLC/Inc. signed a Cooperative Research and Development Agreement (CRADA) in January 2020.

This collaboration will draw global attention to NOAA's research, laboratories and programs serving and protecting the Great Lakes region.

NOAA is provided access to advanced technology platforms including remote vehicles, small boats, and instrumentation collecting real-time environmental data for use in research that supports NOAA's mission and GLERL science priorities.







# Summary





## In summary, GLERL is . . .

NOAA OAR's freshwater research laboratory.

A NOAA leader in invasives research, ecosystem forecasting and biophysical modeling.

Providing leadership and expertise in advancing NOAA's wide programs.

A virtual and physical hub for NOAA and Great Lakes partners.

The NOAA Great Lakes Restoration Initiative's financial management center.

Stewards and leaders of Great Lakes fleet management.

Committed to training the next generation of environmental scientists.



**In the future, GLERL is poised to contribute to formal ecosystem management as a . . .**

Key provider of observing technology innovation.

Leader in cutting edge experimental research.

Developer of advanced ecosystem models.

Communicator of science-based products and services.

Contributor of science advice to the Great Lakes management community.





**Thank you for your attention!**



# Thank you for agreeing to serve as a member of the GLERL five-year science review panel!

We look forward to talking with you during the live Q & A sessions.

## Review criteria:

Quality: The merit of our research and development within the scientific community.

Relevance: The value of our research and development to users beyond the scientific community.

Performance: The effectiveness and efficiency with which our research and development activities are organized, directed, funded, and executed.

## Review week highlights:

- In-depth Q&A/discussions of the overview presentation each theme presentation.
- Meetings with GLERL stakeholders.
- Meetings with GLERL leadership and new staff.

All supporting documents can be found on the GLERL 2021 Review website at:

[www.glerl.noaa.gov/review2021/#documents](http://www.glerl.noaa.gov/review2021/#documents)